REMARKS

Counsel for Applicant wishes to thank the Examiner for the courtesy of the recent interview, the substance of which is incorporated in these Remarks. In view of the foregoing amendments, and for the reasons set forth below which were discussed during the interview, favorable reconsideration of this application is respectfully requested.

As discussed during the interview, the invention relates to storage area networks (SANs), and in particular to the storage processing of packets by a storage switch of a SAN that connects a plurality of distributed hosts or servers with a plurality of distributed storage devices to enable data to be stored and accessed.

Because SANs may desirably employ different types of hosts, servers and storage devices that use different protocols for both data and commands, and the distributed devices of the SAN employ virtual addressing schemes, the storage processing functions which are generally necessary in a SAN include classification, virtualization and translation.   In conventional SANs, these functions are typically performed by discrete elements such as appliances and gateways, which is costly, inefficient, and slows data storage and access.

The invention avoids these problems by performing such storage processing functions in intelligent storage switches that perform not only traditional switching functions, but also perform functions such as classification of packets as data or control packets, virtualization (converting between virtual and physical addresses), and translation of packets from one protocol to another such as between SCSI, Fibre

Channel and IP protocols.   The switches of the invention distribute intelligence to

every switch port, which enables the switch to perform storage processing of packets

"without buffering" and at "wire speed" and, i.e., without introducing any more latency

than would be introduced by a switch that merely performs switching or routing

functions (see specification, page 6, paragraph [0015], lines 15-22; and page 13,

paragraph [0062], lines 12-15.) In particular, as used in the specification (see page

13, paragraph [0062], lines 15-16), the term "wire speed" is defined to be a speed

measured by the connection to the particular switch port, and the term means that a

storage switch can handle the maximum packet throughput rate for the type of

connection to that switch port. Thus, wirespeed processing requires that processing

be without buffering. Examples of the meaning of "wire speed" processing are given

on page 13 of the specification.

I.   The Distinguishing Elements of the Claims

As discussed during the interview, all of the independent Claims 1, 15, 20, 21,

24, 35, 42 and 43 recite at least one of two limitations (elements) that distinguish over

the prior art.   These two distinguishing claim elements are:

(i) that the claimed switch, network or method performs storage processing

"without buffering" packets, or

(ii) that the switch or method performs storage processing "at wire speed".

Accordingly, the various rejections of the claims under 35 U.S.C. §103(a) are

respectfully traversed. For the reasons discussed during the interview, and which are

summarized below, it is respectfully submitted that the prior art of record cannot render

obvious any of the independent claims or any of the claims which depend therefrom, and reconsideration of these rejections is respectfully requested.

II.   The Cited Prior Art

As to the prior art cited by the Office, U.S. Patent No. 6,400,730 to Latif discloses a switch for transferring data over an IP network between SCSI, Fibre Channel and IP network devices. In Latif, incoming data packets at an inlet port are converted to an internal format used by the switch for processing and switching by a switch fabric, and packets are then reconverted back to a native format at a destination port that is appropriate for the device connected to that port. As recognized by the Office, Latif does not teach processing of packets without buffering or at wire speed

The secondary reference relied upon by the Office, U.S. Patent No. 6,693,906 to Tzeng, does not deal with storage networks or storage processing. Rather, Tzeng discloses a network switch for performing layer 2 and layer 3 switching in an Ethernet network, where packets are switched and routed in the network by switches having media access control (MAC) modules which operate at the physical layer. Tzeng does not teach or employ virtual addressing.   Tzeng also does not teach or suggest storage processing of packets without buffering, as claimed. Rather, Tzeng teaches in column 3, lines 60-67 that each switch has an associated CPU and buffer memory that is used to store data frames while the switch fabric processes forwarding decisions for received data packets. Although Tzeng in the introductory portion of his specification discusses the desire for performing layer 2 and layer 3 switching with "minimal

buffering", and discusses the desire for such switching without buffering to lower the cost of the network switch, Tzeng, in fact, teaches buffering of packets.

Tzeng does disclose a packet classifier module that is configured for a buffer-free identification of an incoming data packet to the switch port (see column 3, lines 35-45), however Tzeng does not teach or suggest performing storage processing of packets without buffering.

Claims 1 and 15

Independent Claims 1 and 15 both call for storage command processing of packets without buffering, which is not taught by either Tzeng or Latif. Accordingly, Claims 1 and 15 and Claims 2-14 and 16-19 which depend therefrom cannot be rendered obvious by the combination of Latif and Tzeng.

Claim 20

Independent Claim 20 calls for a switch for use for storing and accessing data that comprises a plurality of linecards, where each linecard includes a plurality of processing units with each processing unit being associated with a port, and calls a classifier, virtualizer, and translator that classifies, virtualizes and translates packets (i.e., performs storage processing functions) at wirespeed. Neither Tzeng nor Latif disclose or suggest a switch having a plurality of linecards that performs the storage processing functions of classification, virtualization and translation of packets as set forth in Claim 20, much less performing such functions at wirespeed as recited in the claim. Accordingly, Claim 20 is deemed allowable over the cited references.

Claim 21

Independent Claim 21 calls for a switch for use for storing and accessing data that includes means associated with each port for performing wirespeed storage command processing of packets. For the same reasons pointed out above with respect to Claim 20, the references do not teach or suggest wirespeed storage command processing of packets as set forth in Claim 21, and cannot render Claim 21 or the claims dependent thereon obvious. Moreover, Claim 21 is written in means plus function language, and must be interpreted as corresponding to the structure disclosed in the specification for performing the recited function of performing wirespeed storage processing of packets and equivalents of the structure. The Office Action does not point out any such structure or equivalent structure in the references, and no such structure is disclosed in the references. Accordingly, Claim 20 and the claims dependent thereon cannot be obvious over the references.

Claim 24

Independent Claim 24 is directed to a storage network that comprises a switch, where the switch performs storage command processing of data packets without buffering the data packets, and Claim 21 and the claims dependent thereon are deemed allowable over the cited references for the same reasons pointed out above in connection with Claims 1 and 15.

Claim 35

Independent Claim 35 is directed to a storage network that comprises a switch, a server operating in accordance with the first protocol, and a storage device operating

in accordance with a second protocol, where the switch receives data for a virtual

target formatted in accordance with the first protocol and has an output for sending the

data to a physical target formatted in accordance with the second protocol at

wirespeed.   Claim 35 thus recites both the virtualization function (converting)

received data for a virtual target to a physical target, as well as translation, translating

received data having a first protocol to a second protocol, and wherein the

virtualization and translation functions are performed at wirespeed.

As discussed, the cited references do not teach or suggest either classification

or translation at wirespeed, and cannot render Claim 35 or the claims dependent

thereon obvious.

Claim 42

Independent Claim 42 is directed to a method for use by a device in a system

for storing and accessing data comprising receiving from an initiator a packet

formatted in accordance with a first protocol and destined for a virtual target,

determining if the packet is a data packet or a control packet (i.e., classifying the

packet); and sending the packet to a physical target formatted in accordance with the

second protocol (i.e., vitualization and protocol translation) if the packet is a data

packet. Thus, Claim 42 recites all three of the storage functions of classification of

packets as data packets or control packets, virtualization by converting an incoming

packet for a virtual target to an outgoing packet for a physical target; and translating

the incoming packet from a first protocol to an outgoing packet at a second protocol,

and where such functions are preformed at wirespeed. Accordingly, since the

references do not teach or suggest classification, translation, or virtualization at wirespeed, the references cannot render Claim 42 obvious.

Claim 43

Independent Claim 43 is directed to a method for use in a device for storing and accessing data, and is substantially the same as Claim 42 except that it recites that all of the processing steps of virtualization, classification and translation are performed without buffering. Since the references do not teach or suggest the classification and virtualization functions, and do not teach or suggest performing any storage functions without buffering, the references cannot render the invention of Claim 43 obvious.

In summary, since neither of the prior art references to Latif and Tzeng individually or in combination teach or suggest storage processing of packets at either wirespeed or without buffering, as set forth in the independent claims, the references cannot render any of the independent claims or the claims dependent thereon obvious. Accordingly, reconsideration of the rejections under 35 U.S.C. § 103 is respectfully requested, and early allowance of all claims is solicited.

If upon consideration of this Amendment any outstanding issues remain, it is requested that the Examiner contact the undersigned before taking further action.

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Respectfully Submitted,

/Barry N. Young/

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Barry N. Young
Attorney for Assignee
Reg. No. 27,744

Customer No. 48789
Law Offices of Barry N. Young
Court House Plaza, Suite 410
260 Sheridan Avenue
Palo Alto, CA 94306-2047
Phone: (650) 326-2701
Fax: (650) 326-2799
byoung@young-iplaw.com